

QBioS Hands-On Modeling Workshop Program

Georgia Institute of Technology

May 22-23, 2017

Instructors:

Prof. Joshua Weitz & members of the QBioS 1st year Ph.D. cohort, including Shlomi Cohen, Nolan English, Elma Kajtaz, Bo Lee, Joy Putney, Hector Velasco, Pedro Marquez Zacarias and Ali Zamani

Sponsors:

Georgia Tech Innovation in Graduate Education and the Burroughs Wellcome Fund

May 22 Program - 8:45am – 4:30pm

- Check in, 8am-8:45am
- Welcome by Joshua Weitz
- Introduction to **Theory in Gene Expression** 9:00am-12:00pm
 - Transcription and Translation
 - Uncertainty in gene expression
 - Paper Discussion: Real-Time Kinetics of Gene Activity in Individual Bacteria
- Coffee Break, 10:15am-10:35am
- **Lunch**, 12pm
- Introduction to **Computing** 1:00pm-4:30p
 - MATLAB or Python
 - Variables and data types
 - Loops
 - Conditional statements
 - Functions
 - Data visualization
- Coffee Break, 2:15pm-2:35pm

May 23 Program - 9:00am – 12:00pm

- **Stochastic Gene Expression Modeling Exercise**
 - MATLAB or Python
 - Generate random numbers
 - Implementing the Gillespie algorithm
 - Sampling from stochastic trajectories
- Coffee Break, 10:15am-10:35am
- **Lunch**, 12pm

May 23 Program – 1:00pm – 5:00pm (Optional)

- **Projects Presentations:**
 - Modeling the Spread of an Invasive Species in a Stream Network, Joy Putney
 - The effect of population size on stochastic individual-based dynamics, Ashley Coenen
- **Breakout Exercises**
Planned Labs: (i) Core coding practice; (ii) Molecular, gene expression [continuation from the morning] (iii) Consultation on incorporating probability models in individual projects.